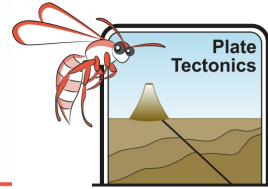


Science of Plates - Student Worksheet



Three teacher demonstrations should help explain how movement of crustal plates can cause different degrees of volcanism and earthquakes.

1. Movement of Crust of Different Densities

We know:

Oceanic crust is denser, younger and thinner than continental crust.

Teacher Demonstration - Density separation of materials

Observe the demonstration

Which is denser, oil or water? Explain your answer.

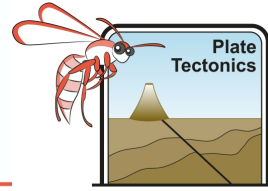
From what happened in this experiment infer what would happen if oceanic crust converged (was pushed together) with continental crust.

What is meant by “an inference”?

Sketch with labels what this would look like in the left section below.

Oceanic crust subducted by continental crust	Continental crust converging with continental crust
Sketch 1	Sketch 2

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2. Varying Thickness of Continental Crust

We know that when continental plates converge, crust is pushed together, crumpled and forms mountains.

Observe the teacher's demonstration. Ice represents crust and water represents the underlying asthenosphere.

Both pieces of ice have the same volume. Is there any difference in how different shapes float in the liquid? Describe any difference.

What information did you gain from this activity that would relate to continental crust "floating" on oceanic crust?

Use this information to create Sketch 2. This will improve upon your first sketch. The concept of a "keel" underlying mountains is also supported by gravity surveys.

Interesting facts

During the period of the last Ice Age the weight of ice on some continents depressed the crust down into the top of the asthenosphere. When the ice melted these continents very slowly started rising (to regain isostasy). This has created raised fossil beach lines round the coast as the land slowly rose above sea level.

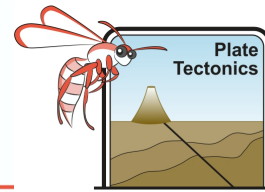
Of course weathering and erosion is extremely slowly removing rock and soil from mountains thereby resulting in an equally slow rise. The rate of erosion and transport however exceed the rate of isostatic rise!

Science changes its ideas as new information becomes available.

As more knowledge is acquired we adjust our ideas as to how things work. Science is not dogma. When we test ideas our ideas we can gain new understanding. Fill in new ways of thinking in the table below.

Observation	Belief in Roman times	Belief in medieval times	Belief in modern times
The student is not learning	Beat his slave	Beat the student	
The patient does not look well	Sweat out the disease	Bleed the patient	

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Observation	Belief in Roman times	Belief in medieval times	Belief in modern times
The volcano is erupting!	We have offended the gods	We have offended God	
This person is filthy.	Make them sweat, scrape off the sweat and rub with oil	Bath once a year whether you need it or not	

3. Crust Chemistry and Viscosity

Viscosity is a measure of a substance's ability to flow. When crust is subducted it is subjected to increasing temperature and pressure. Crust will melt and form magma. The behaviour of that magma will depend on its physical and chemical characteristics. Silica poor magmas flow more easily than silica rich magmas. A volcano erupting silica rich (felsic) magma such as rhyolite will be more explosive than a silica poor (mafic) magma such as basalt.

Tomato sauce represents felsic or silica rich magma made from continental crust that has been subducted and melted under great temperature and pressure. Oil represents mafic or silica poor oceanic crust that has been subducted and melted under great temperature and pressure

Describe the shape of the tomato sauce drop _____

Describe the shape of the water (lower viscosity) drop _____

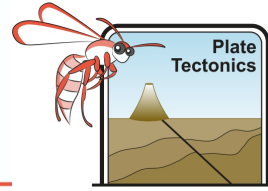
Would this volcano (pictured right) be the result of magma from melted oceanic or continental crust? Explain your answer.



Which magma (molten rock) will produce the most destructive volcanic extrusions?

In your first sketch add a volcano above where the crust was subducted (drawn down). The silica rich continental crust has been melted to produce silica rich (felsic) lava. What shape would your volcano be?

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If iron and magnesium rich oceanic crust had been melted and erupted, what shape would that volcano have been?

What have these experiments to do with converging plate boundaries? _____
